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XXXVIII.—*On the British species of* Mugil, *or Grey Mullets.* By Dr. Albert Günther.

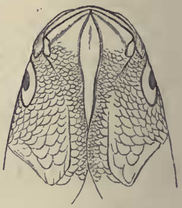
The species of *Mugil* are very numerous, and very similar to one another in general appearance, the genus resembling in this respect some of the Cyprinoids, as *Leuciscus, Abramis,* and others. They can be distinguished from one another only by close examination; the greater part of the difficulty of distinguishing them, however, is owing rather to the incompleteness of the descriptions in our ichthyological works, than to the absence of palpable characters. The latter (such as are hereafter indicated) are very constant in each species, but so little conspicuous, that we find very lengthened descriptions, giving minute details of the general appearance of a fish, but omitting the very character by which it differs from other species. The discovery of these characters is due to Cuvier and Bonaparte, who have carefully used them for the distinction of the Mediterranean species; and it is much to be regretted that, in the great ichthyological work of the former, equal attention has not been paid to the distinction and description of many foreign species, which, if the typical specimens are not re-examined and redescribed, are dead letters in science. It is nearly useless to go beyond Cuvier's period in order to recognize species described by ichthyologists; and when Cuvier, for instance, applies the Linnæan name of *M. cephalus* to a Mediterranean species which is not found on the more northern coasts of Europe, he has been led rather by his own taste (this species bearing the vernacular name of *Cefalo* in Southern Europe) than by an appearance of probability that this species was intended by Linné, who cer-

tainly has adopted Artedi as his guide. But Artedi has given us admirable description of *M. capito.*

This paper is devoted only to the British species of the genus, all of which are comprised under the common name of Grey Mullets.

1. *Mugil capito,* Cuv. (The Short-finned Grey Mullet.)

Nine soft rays in the anal fin; no adipose eyelid; upper lip membranaceous, thin. The depth of the body is one-fifth, or rather less than one-fifth, of the total length. A distinct portion of the maxillary bone is visible behind the angle of the mouth. There is a rather broad, elongate cuneiform space at the chin, which is not covered by the mandibularies and the interopercles. The pectoral fin extends only to the eighth or ninth of that series of scales which commences from the shoulder (lateral line), whilst the origin of the spinous dorsal is vertically above the twelfth or thirteenth. A short pointed scale in the axil of the pectoral. Root of the pectoral with a black spot superiorly*.



Mugil capito.

Cuvier was the first who stated that a species of *Mugil* occurring on the English coast, and probably the same which had been described by Willughby and figured by Pennant, is identical with that Mediterranean fish for which he had chosen the name of *Mugil capito.* One year later (1830) the species was examined by Hancock†, who, not being aware of the name given by Cuvier, calls it *M. britannicus*; he describes the lips as thin, mentions a callus at the corner of the mouth, and nine anal rays, so that we can scarcely doubt that specimens of the true *M. capito* served for his description. The species has been fully established for the British fauna by Couch and Yarrell, whilst Parnell was obliged to borrow his description from Jenyns, as the species appears to be scarce on the Scotch coasts.

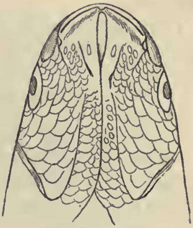
2. *Mugil auratus,* Risso. (The Long-finned Grey Mullet.)

Nine soft rays in the anal fin; circuit of the orbit adipose, but not forming an eyelid; upper lip thin. The depth of the body is less than one-fifth of the total length. Only the outermost

* Only those specific characters are given for this and the following species which serve to distinguish them from other European *Mugiles.*

† Lond. Quart. Journ. Sc. 1830, p. 129.

extremity of the maxillary bone is visible behind the angle of the mouth; the cleft of the mouth is more than twice as broad as it is deep. There is a short lanceolate portion at the chin not covered by the mandibularies. The pectoral fin extends to the thirteenth scale of the lateral line, that is, nearly to the origin of the spinous dorsal, which is vertically above the fourteenth scale. No pointed scale in the axil of the pectoral, and no black spot at its root.



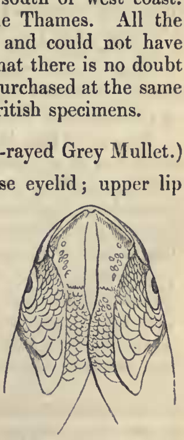
Mugil auratus.

This species is new to the British fauna; it had been previously known from the Mediterranean and from the Canary Islands. Considering its great similarity to *M. capito* in general appearance, it is not improbable that former ichthyologists have confounded it with that species.

I have not been able to find more than two specimens among numerous examples of the Thick-lipped Grey Mullet brought to the London market during the first half of the month of March. It could not be determined on which particular spot of the coast they had been caught; but it was ascertained, from the inquiries made, that all the Grey Mullets which were in the market at that time came either from the south or west coast. No Dutch vessel with fish had entered the Thames. All the specimens, besides, were remarkably fresh, and could not have been brought from any great distance; so that there is no doubt that those two specimens, as well as others purchased at the same time for the British Museum, were truly British specimens.

3. *Mugil octo-radiatus*, n. sp. (The Eight-rayed Grey Mullet.)

Eight soft rays in the anal fin; no adipose eyelid; upper lip thin. The depth of the body is less than one-fifth of the total length ($5\frac{1}{3}$). The outermost extremity of the maxillary is visible behind the angle of the mouth; the cleft of the mouth is nearly half as deep as it is broad. There is a narrow elongate space at the chin which is not covered by the mandibularies and extends between the interopercles. The pectoral fin extends to the twelfth scale of the lateral line; that is, it terminates at some distance from the origin of the spinous dorsal, which is vertically above the fourteenth scale. No



Mugil 8-radiatus.

pointed scale in the axil of the pectoral, and no black spot at its root.

This species is not only new to the British fauna, but also to science, and is founded on a single well-preserved specimen in the British Museum, presented by Mr. Gerrard. It resembles *M. auratus* in general appearance, from which, however, it differs in several characters so well marked, that it will be readily distinguished whenever it occurs. It has only eight soft rays in the anal fin, whilst all the other European species have nine, except *M. cephalus* and, perhaps, *M. curtus*. There is no possibility of its being confounded with the former, which has broad adipose eyelids, and is not found on the British coasts, whilst *M. curtus* is distinguished by an unusually short body, being only four times as long as deep. Variations in the number of the anal rays are of extremely rare occurrence in the Mullets; therefore we are not justified in considering the small number in the present specimen as such an exception, and in ranking the specimen as a variety of *M. auratus*. It differs in several other points besides: the cleft of the mouth is deeper than in *M. auratus*; the free space at the chin is twice as long, and extends between the interopercles; the pectoral is shorter. Nothing can be said of the occurrence of this species on any particular part of the coast; perhaps it is scarcer than its congeners. The attention of British naturalists being now directed to this species, we may hope soon to have better information on its natural history.

4. *Mugil curtus*, Yarr. (The Short Grey Mullet.)

Eight (?) soft rays in the anal fin; lips thin; no adipose eyelid. The height of the body equals the length of the head, and is one-fourth of the total length.

This is all that is known of this species, but quite sufficient to recognize it, if it should occur again on the British coast. Yarrell had a single very young specimen, 26 lines long, which, to judge from the figure, does not appear to have been in a good state of preservation; it has not been preserved in his collection, which was transferred to the British Museum. Valenciennes professes to have recognized the species in a Mullet from the Somme, eight inches long; he does not give a fuller description than Yarrell; and the figure added (Cuv. et Val. Hist. Poiss. pl. 311) distinctly shows nine anal rays, the last two being as distant from each other as the seventh is from the eighth. The pectoral appears to have a short pointed scale in its axil. Yet there can be no doubt that a Short-bodied Grey Mullet exists on the European coasts; but whether the specimen described by Valenciennes is of the same species as that found by Yarrell, is a question the solution of which must be left to further investigation.

5. *Mugil septentrionalis,* n. sp. (The Thick-lipped Grey Mullet.)

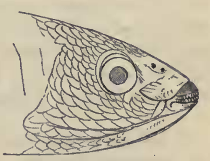
Nine (rarely ten) soft rays in the anal fin; upper lip thick, with two series of short and obtuse papillæ on its inferior third; the extremity of the maxillary is visible behind and below the angle of the mouth. The præorbital is very obliquely truncated, so that its posterior angle is pointed, whilst the anterior is very obtuse and rounded. Mandibles very broad, almost entirely covering the chin. The pectoral extends to the tenth scale of the lateral line; that is, it terminates at a considerable distance from the origin of the dorsal fin, which is above the fifteenth scale, and exactly on the middle between the snout and the base of the caudal.

Mr. Couch* has the merit of having shown that, besides *M. capito,* a second species of Grey Mullet exists on the British coasts; and finding that it has a similarly thick lip as *M. chelo* from the Mediterranean, he has considered it as identical with this southern species. Both the northern and the southern thick-lipped Mullets, indeed, are very similar to each other; and it has been nearly impossible to see, or to show, their specific differences otherwise than by comparison of actual specimens, as the descriptions and representations existing have taken little notice of the distinctive characters. Yarrell and Parnell have adopted Mr. Couch's determination, the latter giving an original description†, in which, however, some of the numbers of the fin-rays are erroneous (2. D. 10, A. 11, instead of 2. D. $\frac{1}{8}$, A. $\frac{3}{9}$); Hancock's *M. britannicus* is placed by him here as a synonym, whilst it is described by Hancock as having *thin lips,* &c.

The characters by which this species differs from the southern are the following:—



M. chelo.



M. septentrionalis.

1. The upper lip is considerably thicker in *M. chelo,* and provided with three series of papillæ.

2. The form of the præorbital is entirely different: in *M. chelo* its extremity is rounded, the anterior angle being not much

* Couch, MS. in Yarr. Brit. Fishes, 2nd edit. vol. i. p. 241.

† Fishes of the Frith of Forth, p. 68.

wider than the posterior (see figure, pl. 309, in Cuv. et Val., which is copied by Parnell, Fishes of the Frith of Forth, pl. 28); in *M. septentrionalis* the præorbital is very obliquely truncated, so that its posterior angle is pointed, whilst the anterior is very obtuse and rounded (see Yarr. Brit. Fishes, 2nd edit. i. p. 243, lateral view of the head).

3. The pectoral fin is much longer in *M. chelo*; it extends to the thirteenth scale of the lateral line—that is, nearly to the origin of the dorsal fin, which is above the fourteenth or fifteenth scale.

4. The whole of the caudal portion is shorter in *M. chelo*, so that the origin of the spinous dorsal fin is nearer to the root of the caudal than to the end of the snout.

These points will suffice to show that *M. chelo* and *M. septentrionalis* are two distinct species*; and we must therefore be careful in using for their determination figures which were executed when the species had not been distinguished.

a. Bonaparte's figure in the 'Fauna Italica' is taken from *M. chelo*; but the outlines of the præorbital are incorrect.

b. Cuv. et Val. Hist. Poiss. pl. 309 represents the head of the true *M. chelo*.

c. Yarrell, Brit. Fishes, 2nd edit. i. p. 241, figure of the entire fish, is a copy from Bonaparte's *Mugil chelo*, and does not represent the British species.

d. Yarrell, *l. c.* p. 243. The lateral view of the head is original, and taken from a British specimen of *M. septentrionalis*; whilst the view from below, again, is a copy of Bonaparte's *Mugil chelo*.

e. Parnell (*l. c.*) copies the head of *M. chelo* from the 'Hist. Nat. des Poissons.'

This species is not confined to the British coasts. Professor Nilsson, who also takes it for *M. chelo*, Cuv., has given an excellent description of it, from which it is evident that the thick-lipped Mullets of Scandinavia are identical with the British; so that *M. septentrionalis* appears to be common to the northern shores of Europe, whilst *M. chelo* frequents the southern.

I do not pretend to give this as a *complete* account of the British Grey Mullets. The present paper contains only the result of observations made on the materials which I have found in the British Museum, and on a collection which the Keeper of the Zoological Department, Dr. Gray, has enabled me to make during the first half of the month of March; and I feel fully convinced that, by continued *accurate* investigations, not

* A difference of minor importance is that *M. chelo* has seven, *M. septentrionalis* five pyloric appendages.

only the species mentioned will be recognized, and their distribution and natural history elucidated (as has been done already by Mr. Couch for *M. capito* and *M. septentrionalis*), but also that others will be discovered, either new to the British fauna or to science in general.

Finally, I cannot refrain from subjoining some remarks on a passage in Yarrell's work, by which I have been particularly struck, not only because it is one of the numerous proofs of Yarrell's admirable dexterity in embodying in his work everything by which ichthyology could be advanced *in a practical way*, but also because it deserves particular attention at a time when the acclimatization of animals and of fishes is so much discussed. I quote the passage in full (2nd edit. i. p. 239) :—

"Mr. Arnould put a number of the fry of the Grey Mullet about the size of his finger into his pond at Guernsey, which is of about three acres' area. After a few years, Mullets of four pounds' weight were caught, which proved to be fatter, deeper, and heavier, for their length, than others obtained from the sea. Of all the various salt-water fishes introduced, the Grey Mullet appeared to be the most improved. A slight change in the external colour is said to be visible."

It needs no comment to prove that the plan of Mr. Arnould, as stated by Yarrell, must give a return worthy of consideration, if systematically and more extensively carried out. The Grey Mullets belong to the better fishes for the table, especially the thick-lipped species, and at present fetch a price of 6*d.* to 9*d.* per pound in the London market. Besides, the ponds in which they are kept will afford constant opportunity for fly-fishing.

This is only one of the numerous examples from which it could be shown that, if the natural resources which this country possesses in its indigenous species of fishes are resorted to and developed, and if due attention is paid to improving the condition and the number of the individuals, the endeavours to increase the natural stock by the introduction of foreign species lose much of their *practical* value. And is it not quite clear that such foreign species, when their introduction has become an accomplished fact by long-continued efforts and by a great expense of money, will require at least the same care and attention as the indigenous species, if they are expected to yield an adequate return?

The possibility of transferring marine fishes into freshwater ponds was indicated by Mr. E. T. Bennett, formerly Secretary to the Zoological Society, as far back as the year 1828. After giving an account of an ichthyological collection made by Mr. Frembly in the Sandwich Islands (Zool. Journ. 1828, iv. p. 32), he adds—

"There is, however, another point of view in which the collection possesses a very peculiar attraction—the probability that the fishes composing it, though natives of the ocean, actually become naturalized in fresh or nearly fresh water, and are thus preserved and improved for the use of man. It is not a little extraordinary that a fact of so much importance to the comforts and even the necessities of life should have been brought but recently under the notice of the civilized people of Europe, while to the uncultivated inhabitants of the Sandwich Islands it has probably been long and practically known. It forms, indeed, a very important part of the employment of the common people to search among the pools left by the retiring tide for the smaller fry which may be there retained, and to convey them to ponds, in which in a short time they increase to a size fit for the table."

Yet, although I consider the acclimatization of foreign species of fishes as a matter of subordinate value from a *practical* point of view, it is a problem of high *scientific* importance, because it involves the solution of the question, how far the power of man is able to interfere with the original distribution of fishes? It would far exceed the limits of this paper if I were to enter into proposals or conjectures on the experiments by which we might hope to solve a portion of that problem. It may suffice if I venture to offer an opinion to those who are particularly interested in the subject, namely, that for the first experiment a species ought to be chosen from a climate similar to that of England; that no other species can be recommended with better right than the *Wels* of the Continent (*Silurus glanis*); that if the experiments should be extended to tropical species, fishes from the family of the *Labyrinthici* ought to be selected, because they are very tenacious of life and can live without water for days. The *Gorami* (*Osphromenus olfax*), one of the best freshwater fishes of the tropics, growing to the weight of ten to fifteen pounds, and already introduced in Mauritius and Cayenne, the Climbing Perch (*Anabas scandens*), and the *Pla Kat* of the Siamese (*Betta pugnax*), would deserve the first attention*.

* The two latter species would be fishes of luxury, like Gold-fish. The *Pla Kat*, which also occurs in the Malayan Peninsula, is, according to Dr. Cantor, a great favourite with the Siamese. They keep them like Gold-fish, and produce several varieties, one of which has great fighting propensities. "The Siamese are as infatuated with the combats of these fishes as the Malays are with their cock-fights, and stake considerable sums, and sometimes their own persons and their families. The license of exhibiting fish-fights is farmed, and affords a considerable annual revenue to the King of Siam."—Cant. Catal. p. 87.